Standard Products
keeping the industry running

Value proposition and application insights
NXP OFFERS SECURE CONNECTIONS FOR A SMARTER WORLD

**SMART HOMES & BUILDINGS**
- Wireless smart lighting systems
- Low power wireless networking for climate and energy systems
- Wired intelligent lighting and building control (DALI, DMX, KNX...)
- Ultra low power building multi-sensors
- Contactless building & room level access systems
- Network authentication and cyber security solutions
- Smart appliance technologies
- NFC based pairing of home network devices
- Security & surveillance systems (IPCAM)

**SMART GRIDS**
- End-to-end smart grid security solutions
- Contactless energy pre-payment systems
- Zigbee Smart Energy home area networking

**SMART INFRASTRUCTURE**
- Wireless intelligent street lighting
- Intelligent Traffic Systems
- Contactless public transport ticketing
- Intelligent road tolling systems

**SMART SHOPPING**
- Secure mobile transactions
- NFC assisted shopping & self-check-out
- RFID based store security & logistics

**SMART HEALTHCARE & FITNESS**
- Secure E-health systems providing preventive care
- Secure Medical Body Area Networks (vital signs, temp)
- Connected accessories (watches, wristbands, etc)

**MOBILITY & CONNECTIVITY**
- Energy efficient Smart Phones & Tablets
- Wireless Communications

**CONNECTED CAR**
- Wireless car safety
- Telematics systems
- Car radar
- Car-2-X communication
- Digital Broadcast

**INDUSTRY 4.0**
- Intelligent factory automation
- Secured and connected machinery
- Production management & lot control with RF

**SMART INFRASTRUCTURE**
- Wireless intelligent street lighting
- Intelligent Traffic Systems
- Contactless public transport ticketing
- Intelligent road tolling systems

**SMART GRIDS**
- End-to-end smart grid security solutions
- Contactless energy pre-payment systems
- Zigbee Smart Energy home area networking

**SMART HEALTHCARE & FITNESS**
- Secure E-health systems providing preventive care
- Secure Medical Body Area Networks (vital signs, temp)
- Connected accessories (watches, wristbands, etc)
NXP STANDARD PRODUCTS IS FOCUSING ON MEGATRENDS TO ADDRESS THE INDUSTRIAL MARKET REQUIREMENTS

Key Industrial applications....

- Building & Home Automation
  - Heating / Climate Control
  - Security/Home automation
  - Infrastructure Power Supply

- Manufacturing & Process Automation
  - Manufacturing automation
  - Motor Drives
  - Machine-to-Machine Communication
  - Human-Machine-Interface (HMI)

- Transportation
  - Motor Control
  - E-vehicles
  - Battery management

- Power Tools
  - AC Mains Motor Control
  - Cordless Motor Control

....driven by key trends

- Energy Efficiency

- Connected and Smart Devices

- Reliability in Product and Service

....addressed by NXP Standard Products

- NXP offers diodes, transistors and PowerMOS with benchmark values for low resistance, low saturation or forward voltage

- LFPAK56 power MOSFETS have the best in class power density and current rating

- Industrial PowerMOS Mostly qualified at 175°C

- SABER™ (Super Advance Best Efficiency Rectifier) offers efficiency gains, reduced cooling requirements and high temp capabilities

- Especially for high power designs, NXPs TO220/D2PAK package family is the ideal solution while for shranked designs NXP has a wide range of DFN package solutions

- NXP Clipbonding (Flatpower, LFPAK) technology offer lowest parasitics, high thermal performance, reliable package and enabling power miniaturization
NXP STANDARD PRODUCTS OFFERS A WIDE AND INNOVATIVE PORTFOLIO TO ASSURE A ONE-STOP SHOP ACROSS MULTIPLE MARKET SEGMENTS

<table>
<thead>
<tr>
<th>Small Signal Discretes</th>
<th>Power</th>
<th>Logic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diodes &amp; Transistors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Zener diodes (BZX84)</td>
<td></td>
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<tr>
<td>• Switching diodes (BAS70/40, BAT54x, BAVxx)</td>
<td></td>
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<tr>
<td>• Bipolar transistors (BC847x, MMBTx, PMBTx)</td>
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<tr>
<td>• Resistor-equipped transistors (RETs)</td>
<td></td>
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<tr>
<td><strong>Small Signal MOS</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Small Signal MOSFETs (PMVx)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sub mΩ RDSon</td>
<td></td>
<td></td>
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<tr>
<td><strong>Protection and Signal Conditioning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Network protection devices (CAN / LIN / FLEX and LVDS)</td>
<td></td>
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<tr>
<td>• ESD protection diodes (PRTRxx, PESDxx) and signal conditioning (IP47xx)</td>
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</tr>
<tr>
<td>• TVS diodes (400/600W)</td>
<td></td>
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<tr>
<td><strong>PowerMOS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sub mΩ RDSon (PSMNx)</td>
<td></td>
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<tr>
<td>• 95% of the products qualified at 175°C</td>
<td></td>
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<tr>
<td>• Highest Reliability</td>
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<tr>
<td>• Outstanding Safe Operating Area</td>
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<tr>
<td>• Both Standard and Logic threshold levels</td>
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<tr>
<td>• Repetitive avalanche rating</td>
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<tr>
<td><strong>Medium Power Transistors/Diodes</strong></td>
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<tr>
<td>• Medium to High Power Transistors/Diodes</td>
<td></td>
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</tr>
<tr>
<td>• Low VF Schottky rectifiers/diodes (PMEGxx)</td>
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<tr>
<td>• PN Rectifiers in FlatPower</td>
<td></td>
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<tr>
<td>• Low VCEsat transistors (PBSSxx)</td>
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<tr>
<td>• Power diodes (Ultra/Hyperfast FFC diodes</td>
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<tr>
<td><strong>Thyristors</strong></td>
<td></td>
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<tr>
<td>• SCRss</td>
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<tr>
<td>• 3Q Triacs (BTA2xx / BTA3xx/BTA4x)</td>
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<tr>
<td>• 4Q Triacs (Z010x, BTxx)</td>
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<tr>
<td>• ATC/ACTT range with extra protection functions</td>
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<tr>
<td><strong>Logic Families</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Low Voltage 1.8-3.3V (LV, LVC, AUP, ALVC, LVT, ALVT, CBTLV)</td>
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<tr>
<td>• High Voltage 5V-15V (HEF, HC/T, AHC/T, VHC, FAST, ABT, CBT)</td>
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<tr>
<td>• Shift Register based LED drivers (NPIC)</td>
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<tr>
<td><strong>Logic Functions</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Control Logic (00/02/05/08)</td>
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<tr>
<td>• Interface Logic (14/125/244/573)</td>
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<tr>
<td>• I/O Expansion (138/165/595/405x/485x)</td>
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<tr>
<td>• Configurable Logic (57/58/97/98/99)</td>
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<tr>
<td>• Combination Logic (0832/3208)</td>
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</tbody>
</table>
ONE STOP SHOP, WITH > 4000.... TRANSISTORS, DIODES, TRIACS, ESD & TVS, POWER MOSFETS AND LOGIC

AND RESULTED IN BEING THE #1 SUPPLIER FOR STANDARD PRODUCTS

70B PCS SHIPPED ANNUALLY!

*WSTS, BU SP reported revenue 2014 1.26$B
LEADING THE MARKET WITH PACKAGE TECHNOLOGIES TO SUPPORT INCREASED POWER MOSFET REQUIREMENTS

.........POWER-UP, LOSSES DOWN

- High Power Density
- Low $R_{DSon}$

**Trench6**
(60V to 100V)
- Logic & Std Level

**NextPower**
Cordless
(30V to 60V)
- Logic & Std Level
- High Current
- Low $R_{DSon}$
- Schottky like

**NextPower S3**
(30V to 60V)
- Logic Level
- Low $R_{DSon}$
- Schottky like

- Miniaturization
- Higher Switching Capabilities
- Low $R_{DSon}$

Rugged/Simple/Reliable Construction
HIGHLY EFFICIENT SUPPLY CHAIN TO SHIP OVER 70B PIECES A YEAR...

...WHERE WE EXCEED THE AEC-Q101/100 QUALIFICATIONS

...AND WHERE QUALITY IS KEY WITH A FAILURE RATE <10 ppB
LEADING THE MARKET WITH PACKAGE TECHNOLOGIES TO SUPPORT INCREASED BIPOLAR POWER REQUIREMENTS

<table>
<thead>
<tr>
<th>Year of introduction</th>
<th>TO220</th>
<th>DPAK/D2PAK</th>
<th>New TO220 for TOP Triac</th>
<th>IITO220 Optimization</th>
<th>ITO3/TOP3</th>
<th>High current Modules Packages</th>
<th>SOT23AB</th>
<th>High current Modules Packages</th>
<th>LFPACK</th>
<th>SMx</th>
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<tr>
<td>2012</td>
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</tbody>
</table>

- **SiC**
  - TO220
  - TO220F
  - IITO220
  - DPAK/D2PAK
  - SOT82
  - SOT223
  - TO92
  - SO8

- **Thyristors**
  - TO220
  - 2pin TO220
  - TO220F
  - 2pin TO220F
  - DPAK
  - D2PAK
  - DO201AD

- **Diodes**
  - TO220
  - TO220F
  - 2pin TO220F
  - DPAK
  - D2PAK
  - DO201AD
Package change in Industrial application
- Smaller package adoption driven by more electronics, improved thermal and smaller sized applications
- Solderable side pads to enable visual inspection

SMALL SIGNAL DISCRETE AND LOGIC SHOW A CLEAR TREND TO PACKAGE MINATURISATION

Industrial & Automotive today

Industrial & Automotive tomorrow

Portable ‘today’

Portable ‘tomorrow’

- Solderable side pads

Die in / on PCB

Die in / on PCB

Pitch [mm]

Height [mm]

Solderable side-pads

Automotive / Industrial

Computer / Consumer

Mobile
KEY APPLICATIONS THAT KEEPS THE INDUSTRY RUNNING
Key products:

- High Current Triacs
  - White Goods
  - Heating, Power Tools (connected to the mains)
  - High current Triacs up to 25 up to 40A e.g. BTA440, BTA425Y, BTA425X
  - DPAK, D2PAK, TO220, TO247

- Hyperfast and Ultrafast Power Diodes
  - Air Conditioning using inverters
  - Very fast recovery times / low switching losses / low leakage currents

- Power diodes for PFC in air conditioning inverters
  - Power Diode used for rectification in inverter air con are fitting perfectly

- 2nd side rectifiers for low power AC/DC
  - PMEG45x10EPD MEGA Schottky Rectifiers in CFP15
  - 1.8bln smart phone and tablet chargers

- Low noise linear regulators
  - PHPT61003PY: High Power bipolar Transistors in LFPAK (PowerSO8) for high power supplies (Telecom, Server)
Key products:

- NextPower Cordless PowerMOS for Professional Power Tools
  - 30, 40 and 60V
  - Logic Level and Standard Level
  - Up to 150A in TO220
  - Low $R_{DSon}$
  - LFPAK56, D2PAK and TO220

- NextPower S3 PowerMOS for Hobby Power Tools
  - 25-30-40V range
  - Logic Level
  - LFPAK56, LFPAK33

- Logic for Industrial
  - 5 V & 3.3 V families
  - Transceivers (16244/16245)
  - Buffers with 3-state outputs (125/126)
  - Latches (373/573)
  - Shift registers (595)
  - Control logic
Increase the Mileage of E-Bikes

E-Bikes - application impact of Standard Products

**Market Demands**
- Customers demand **long mileage** for their E-Bikes
- **Lightweight solutions** are required to reduce weight of an E-Bike for handling comfort and electrical efficiency
- Modern designs require slim and **space optimized designs**
- **High power density** is necessary to support state-of-the-art concepts
- Improving electronic designs leverages the positive effect of already **eco friendly** E-Bikes

**Application Focus**

**NXP Solutions**
- LFPAK56 power MOSFETs have the best in class **power density** and current rating
- Especially for **high power designs**, NXPs TO220/D2PAK package family is the ideal solution
- **Miniaturization** through footprint and volume reduction: wide selection of Logic Level Mosfet can help to **optimize designs** by minimizing the bill of material
- LED and Gate drivers provide low cost custom solutions driven by component reduction demand

**For more info...**
- NXP QuickLearnings
- NXP Standard Products for E-Bikes
- NXP Industrial
- NXP E-Bike Application
- 2014 PowerMOS Selection Guide
- 2015 Discretes Selection Guide
- ESD Protection Application Guide
- Standard Products Industrial Pitch version 2014

**System Overview**

**Highlight Products**
- **PowerMOS**
  - 40V and 60V NextPower in LFPAK and TO220/D2PAK
  - High switching and high efficiency PowerMOSFETs
- **Small Signal Discretes**
  - Surge Protection Diode
  - Schottky Diodes
  - ESD Protection
  - NCR4x LED Drivers
Higher Density/Lower Power Embedded PCs

Market Demands
- Highly specialized solutions, embedded PCs serve special requirements to optimize systems
- Optimized systems must be highly efficient
- Robustness is often required to function in rugged operating environments
- Modern designs require slim and space optimized designs
- Lower voltages at the core of the system result in the need of voltage translators to interface to peripherals
- Stability and reliability even when used by different users with different interfaces

Application Focus

NXP Solutions
- Miniaturization through footprint and volume reduction: wide selection of small leadless packages
- LFPAK56 power MOSFETs have the best in class power density and current rating
- Large portfolio of level shifters covering all needs on voltage range, low power or high speed
- Smaller MCUs can be used by using multiplexers and shift registers reducing the number of IOs on the MCU

System Overview

Highlight Products
Logic
- Voltage Translators
- Shift registers
- Multiplexers
MOSFET
- NextPower in LFPAK
Small Signal Disretes
- Surge Protection Diode
- Schottky Diodes
- ESD Protection

For more info...
- NXP Standard Products for Embedded PC – NXP Quick Learning 40
- NXP Industrial
- NXP Embedded PC
- General-purpose logic solutions
- 2014 PowerMOS Selection Guide
- 2015 Discretes Selection Guide
- ESD Protection Application Guide
- Standard Products Industrial Pitch version 2014
Increase the **Performance** of EV Chargers

**EV Charger – application impact of Standard Products**

### Market Demands
- **Fast charge** for Electrical Vehicles
- Legislation requires **Power Factor Correction**
- **High efficiency** using secondary side synchronous rectification
- **Space reduction** to optimize state-of-the-art electronic designs
- **High power performance**
- Generate **low EMI**

### Application Focus

![Image of EV Charger]

### NXP Solutions
- LFPAK56 power Mosfets have the best in class **power density** and current rating
- Especially for **high power designs**, NXPs TO220/D2PAK package family is the ideal solution
- Best in class **system efficiency** with NXP SiC Power diodes
- NXP LED drivers for LCD and Control Backlighting

### System Overview

![Diagram showing system overview]

### Highlight Products
- **40V to 100V NextPower**
- Power MOSFETs in LFPAK56 and TO220/D2PAK
- **Ultra High Efficiency SiC** diodes for PFC circuits

---

For more info...
- [NXP Industrial](#)
- [2014 Power Bipolar Selection Guide](#)
- [2014 PowerMOS Selection Guide](#)
- [2015 Discrete Semiconductors Selection Guide](#)
- [2015 Logic Selection Guide](#)
- Standard Products Industrial Pitch version 2014
Increase the **Performance of PSUs**

*Industrial PSU – application impact of Standard Products*

**Market Demands**

- Legislation requires **power factor correction**
- **High efficiency** using secondary side synchronous rectification
- **High efficiency** O-ring for back-up power supply
- **Space reduction** to optimize state-of-the-art electronic designs
- **High power performance** in smaller packages
- Semiconductors with **low EMI sensitivity**
- **Low susceptibility** to noise and surges

**Application Focus**

**NXP Solutions**

- LFPACK56 power Mosfets have the best in class **power density** and current rating
- Especially for **high power designs**, NXP's TO220/D2PAK package family is the ideal solution
- Best in class **system efficiency** with SiC Power diodes
- Lowest RDSon LV PowerMOS offers best in class **power ORing** function

**For more info...**

- [NXP Standard Products for Industrial PSUs – NXP Quick Learning 37](#)
- [NXP Industrial](#)
- [NXP Industrial PSU](#)
- [2014 Power Bipolar Selection Guide](#)
- [2014 PowerMOS Selection Guide](#)
- [2015 Discretes Selection Guide](#)
- [Standard Products Industrial Pitch version 2014](#)

**System Overview**

**Highlight Products**

- 40V to 100V NextPower Power MOSFETs in LFPACK and TO220/D2PAK
- Ultra High efficiency SiC diodes for PFC circuits
Make AC Power Tools more robust

AC-Mains Power Tools - application impact of Standard Products

Market Demands

- High performance & robust Power Tools
- Electronics must survive when Power Tools are misused
- Continuous high current capability
- Electronics must be able to withstand high temperatures
- High power density is required to combine small size and high power
- Space reduction and lightweight solutions for modern designs

For more info...

- NXP Standard Products for Power Tools – NXP Quick Learning 39
- 2014 Power Bipolar Selection Guide
- 2015 Discretes Selection Guide
- Standard Products Industrial Pitch version 2014

Application Focus

NXP Solutions

- NXP produces planar passivated Triacs and SCR’s, for best high voltage and high temperature robustness
- NXP 3 Quadrant Triacs and SCR’s have excellent immunity to false triggering
- Especially for high power designs, NXP offers the internally insulated TO220 package (SOT78D)
- Current power range is up to 25A
- Voltage range consists of 600, 800, and 1000V

Highlight Products

Triacs
- BTA416Y-800B or C
- BTA425Y-800BT or CT

Silicon Controlled Rectifiers (SCR)
- BT151 series

System Overview
Increase DC Power Tools Battery Time

Battery Operated Power Tools - application impact of Standard Products

Market Demands

- High performance & robust Power Tools
- Electronics must survive when Power Tools are misused
- Continuous high current capability
- Electronics must be able to withstand high temperatures
- High power density is required to combine small size and high power
- Prolonged independent operation and long battery time
- Space reduction and lightweight solutions for modern designs

Application Focus

![Power Tool Image]

- NXP Solutions
  - NXP Trench technology MOSFETs with low Rdson for low conduction losses
  - NextPowerS3 technology with best in class switching performance and low EMI
  - Clipbonded PowerSO8 (LFPAK56) for low Rth, low inductance and 175°C Tjmax
  - Especially for high power designs: TO220, D2PAK and D2PAK-7 packages
  - Miniaturization through footprint and volume reduction with LFPAK56
  - Wide selection of Logic Level MOSFETs can help to optimize designs by minimizing the bill of material

For more info…

- NXP Standard Products for Power Tools – NXP Quick Learning 39
- 2014 PowerMOS Selection Guide
- 2015 Discretes Selection Guide
- Standard Products Industrial Pitch version 2014

System Overview

![System Diagram]

Highlight Products

- PowerMOS
  - NXP PowerSO8 (called LFPAK56)
  - Dual mosfet LFPAK56D for low power designs
  - Special wide SOA (safe operating area) mosfets
  - Gate drivers
NXP STANDARD PRODUCTS

YOUR 1st CHOICE FOR DIODES, TRANSISTORS, ESD & EMI FILTERING, SSMOS, PwrMOS, TRIACS, THYRISTORS, LOGIC

GLOBAL TRENDS

> REFLECTED IN >4000 TYPES

<table>
<thead>
<tr>
<th>Small Signal Discretes</th>
<th>PowerMOS</th>
<th>Logic Functions</th>
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</thead>
<tbody>
<tr>
<td>Diodes &amp; Transistors</td>
<td>Sub-mA</td>
<td>Low Voltage I-V, A-W, A-V, U-V</td>
</tr>
<tr>
<td>Small Signal MOSFETs</td>
<td>Sub-mA</td>
<td>Lowest static operation, high performance</td>
</tr>
<tr>
<td>• Network protection devices (SAN, LNK, FUSE and LVGS)</td>
<td>• Configurable Logic (35/50/75/80/85/100)</td>
<td></td>
</tr>
<tr>
<td>• ESD protection devices (PROT-Riv, RDed) and signal conditioning (PADCs)</td>
<td>• Combination Logic (05/06/07/08/09)</td>
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</tr>
<tr>
<td>• TVS diodes (ASR/ASDN)</td>
<td>• Custom Logic (03/04/05/06)</td>
<td></td>
</tr>
</tbody>
</table>

> ENABLED BY

- COST EFFICIENT SUPPLY CHAIN
- HIGH QUALITY WITH <10 PPBILLION FAILURE RATE
- EXTENDED AECQ-100/101 PORTFOLIO
- BEST IN CLASS PACKAGES

> AND RESULTED IN BEING THE #1 SUPPLIER FOR STANDARD PRODUCTS

WITH 11.4% MARKET SHARE*

<table>
<thead>
<tr>
<th>Energy Efficiency</th>
<th>Connected &amp; Smart Devices</th>
<th>Reliability in Product &amp; Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>• COST EFFICIENT SUPPLY CHAIN</td>
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<tr>
<td>• HIGH QUALITY WITH &lt;10 PPBILLION FAILURE RATE</td>
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<tr>
<td>• EXTENDED AECQ-100/101 PORTFOLIO</td>
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<tr>
<td>• BEST IN CLASS PACKAGES</td>
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</table>

Front End
- Hamburg, Germany
- Manchester, UK
- Nijmegen, the Netherlands
- Global Foundries, Singapore
- ASMC, China

Back End
- ASEN, China
- Guangdong, China
- Cabuyao, Philippines
- Seremban, Malaysia
- Bangkok, Thailand

R&D
- San Jose (HQ, Logic)
- Nijmegen (Logic)
- Hamburg (HQ, Discrete)
- Manchester (HQ, PwrMOS)
- Shanghai (HQ, Bipolar Pwr)

AND UP TO 70B PCS SHIPPED!

*WSTS, BU SP reported revenue 2014 1.26$B
